I KEPT NO DIARY

AIR COMMODORE F. R. (ROD) BANKS

Preface

This autobiography is not strictly a technical treatise, though certain aspects of my work might be of historical interest to those who have been similarly involved. I have for more than sixty years been engaged in the development and running problems of the internal combustion piston engine (marine diesels, automobile and aero engines). Then, in 1944–46, I was responsible for the future planning of the aero gas turbine engine.

Anyone so closely involved in his professional life with two major developments of universal importance can consider himself exceptionally lucky. I was associated with the introduction and use of the anti-knock compound, tetraethyl lead, and then, some eighteen years later, the aero gas turbine. This is the luck for which, when it comes, the recipient can give thanks to the Almighty because any job, anywhere, requires an element of luck to complement what professional skill or ability he may have.

The introduction of tetraethyl lead in the States, where it was discovered as a very potent anti-knock compound, was attended by a considerable resistance movement from some large and prejudiced oil companies and also from Government oil cartels elsewhere. In Europe, excess alcohol (from the vineyards) and benzole (from coal and coking ovens and the steel plants) were Government monopolies, and these components were added to gasoline (petrol) to improve its anti-knock value. This alcohol/benzole monopoly was not entirely satisfactory because the quantities available varied according to, say, the grape harvest and/or steel production. Therefore, the knock rating (anti-knock value) was often inconsistent. But, with the lower compression ratios and lower specific power output of automobile engines between the two World Wars, and few motor roads in Europe, these differences were not always so apparent and caused little damage except possibly to some sports car engines. There was also the question of the health hazard of tetraethyl lead which had to be contested and argued in a number of countries. However, from its start and because of the meticulous and rigid controls and attention to the health of the individual workers in the lead manufacturing plants and others handling it, tetraethyl lead has had a clean bill of health for half a century. It has permitted the design of more efficient (high compression) engines to take advantage of gasoline (petrol) of higher and consistently maintained anti-knock value; not only in producing fuel of a standard quality but raising that standard from time to time, to meet engine demands, at a relatively moderate increase in refining costs.

In a different way, but with a profound influence upon aviation, came the development of the gas turbine. In about three decades it has virtually eliminated the piston engine, except for the small private aircraft. The aircraft designer, and the aerodynamicist at his right hand, have been given a prime mover of practically unlimited power and thrust, whereas the piston engine was relatively restricted in power which could only be advanced by somewhat small increments after considerable development effort. The aeronautical engineer's 'field day', to take advantage of the thrust potentialities of the gas turbine, resulted from the advances first disclosed when the allies went into Germany and found important developments in the aerodynamics field, like the swept wing. Since then have come further improvements in structures and materials of construction – such as titanium.

These aerodynamic advances could only have been exploited by the invention of the gas turbine – the turbojet, the propeller turbine and the fanjet; particularly the turbojet, which has taken the aircraft up to the high subsonic (mach 0.9), the supersonic (mach 2.2–2.5) and to the edge of the hypersonic (mach 3). From the original Whittle engine to those that have followed it over the last thirty years, the specific fuel consumption (sfc), in pounds of fuel per pound of thrust per hour, has been reduced to about a third (from approximately 1.5 lb/lb/t/hr to 0.5 lb/lb/t/hr) by a combination of high pressure ratio, improved component efficiency and higher turbine working temperature. More recently, the ducted fan has still further reduced the specific fuel consumption and noise levels in some engines by increased bypass ratio, still higher pressure ratio and turbine temperature to give an sfc of near to 0.45.

The Concorde, which has four straight, two-spool, turbojets of the axial type, flying at Mach 2 at 50,000 ft, requires about 145,000 equivalent thrust horsepower. Under these conditions, it has an sfc of about 0.337 lb/ethp and a pressure ratio of 88:1.

Aerospace, including rockets, thus covers such a wide spectrum in the advanced technologies, electronics included, that any country capable of exploiting them can expect to be with the world leaders.

I started to learn the engineering of my day when an apprentice of only fourteen years of age. My father was an engineer and worked with the early automobile and aviation engines. Helped by his knowledge, I often went with him to automobile races and speed trials and to some of the earliest aviation meetings.

Though not educated in the formal sense, my engineering apprenticeship and the continuous learning process which goes with all advances in engineering has stood me in good stead by its complete involvement.

This is not an adventure story, since, in any case, I could not write sufficiently dramatically or well. It might, however, be described as a personal record of events in which an engineering life has involved me, a life that could be considered a vocation rather than just a job.

I chose the title *I Kept No Diary* because, while on active service at sea in the First World War, we were enjoined not to keep diaries in the event of capture. In any case I am not of the diary-keeping fraternity.

F. R. B.,
London, 1978.

Contents

WORLD AIR SPEED RECORD HOLDER 1931

Flt./Lt. Stainforth in S6B, after successful speed record attempt (407 mph.)